Problem: HBr has a molecular weight of 81 while CH_4 has a molecular weight of 16. HBr effuses through a opening at 4 ml/sec. at what rate will the CH_4 effuse through the same opening.

The speed of effusion of gases is inversely proportional to the square root of their molecular weight.

$$\frac{rate_A}{rate_B} = \frac{\sqrt[2]{M_B}}{\sqrt[2]{M_A}}$$

In this case $rate_A$ is HBr and $rate_B$ is CH_4. Therefore to find $rate_{CH4}$, we will find $rate_B$. We know the following information from the problem.

$$rate_A := 4$$
$$M_A := 81$$
$$M_B := 16$$

Therefore,

$$nonlinsolve\left(\frac{rate_A}{rate_B} == \frac{\sqrt[2]{M_B}}{\sqrt[2]{M_A}}, rate_B\right) = 9$$

And the rate of effusion is 9 ml/sec.